SmARTFADE™

Control Console Service Manual

Revision A

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Table of Contents

Introduction 1
Help from ETC Technical Services 1
Section 1: SmartFade Block Diagram 2
Section 2: Built-In Test Routines 2
General User Interface Test 3
LED Test 3
LCD Test 3
DMX Test 3
MIDI Test 4
USB Test 4
Memory Card Test 4
System ID Test 5
Internal Memory Test 5
Firmware Upgrade 5
System Shutdown 5
Section 3: General Repair Strategy 6
Section 4: Hardware Level Troubleshooting 6
DMX - In/Out 6
Immediate Help 6
MIDI - In/Out 6
Immediate Help 6
Section 5: Recommended Spare Parts 7

Appendix A: SmartFade PCB's 9
SmartFade Main PCB 10
SmartFade I/O PCB 12
SmartFade Extension PCB 13
SmartFade LCD Raiser PCB 14
SmartFade Memory Card PCB 14

Introduction

This document is intended to assist service centers and repair facilities in testing, troubleshooting and repairing ETC SmartFade Consoles. Included is a series of internal diagnostic tests, theories of operation, and repair strategies.

Help from ETC Technical Services

If you are having difficulties, your most convenient resources are provided in the user manual provided with your product or this service manual. To search more widely, try the ETC website at www.etcconnect.com. If none of these resources is sufficient, contact ETC Technical Services directly at one of the offices identified below. Emergency service is available from all ETC offices outside of normal business hours.

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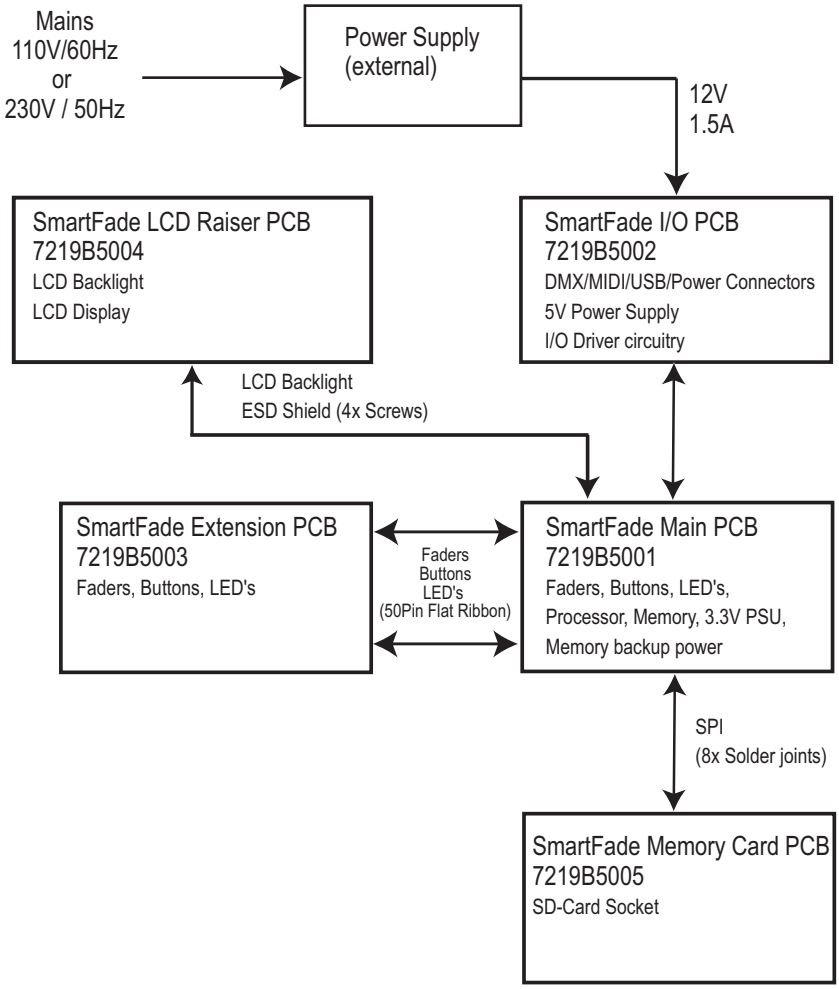
Section 1: SmartFade Block Diagram

Prints for all five circuit boards used in the SmartFade console are located on page 9 of this manual.



Section 2: Built-In Test Routines

The SmartFade console provides a built-in self test facility that tests all sub-systems, accomplishes a memory deep clear, initiates a software upgrade, and assist the technician to identify and locate potential problems.

- **To enter the self-test menu** - hold down the [✓] button during power up. At the end of the initial LED fade, the system should automatically enter the diagnostics mode.

In diagnostics, there are a number of tests for all the sub-systems. By pressing the [✓] button, the next test is entered.

General User Interface Test

The first test is a general user interface test. This test provides feedback on all the user interface elements including buttons, faders, and encoders. In addition this test provides visual feedback to the user via the LCD and Button LED's.

The following functions are implemented within this test:

Channel faders:	Set the intensity of the corresponding bump-button LED.
Bump buttons:	Blinks the corresponding button, and turns it off after release.
A-fader:	Contrast of the LCD Display (A-fader should be at 100% for this test!)
B-fader:	LCD backlight and Power button intensity.
Bump Master fader:	ETC Logo intensity
Grand Master fader:	Control buttons intensity
Independent 1 button:	Switch the Bump buttons to RED
Independent 2 button:	Switch the Bump buttons to Green

LCD:	The LCD will display the received user interface messages.
	• It will display the message source (button, fader, or encoder).
	• The button, fader, or encoder number.
	• The message number (wrap-around text after 100 messages)
	• The Message Value:
	  • Button = up / down
	  • Encoder = up / down
	  • Fader = Value (0 → 255)

Press the [✓] button to proceed to the next test.

LED Test

This test Turns on all LED's of the board starting with all red bump buttons, then all green bump buttons, and lastly control buttons. To proceed to the next color / test, press the [✓] button.

LCD Test

This test will cycle through the characters of the LCD display. The same character will display on all LCD positions for a half second, then will proceed to the next character. Press the [✓] button to proceed to the next test.

DMX Test

This is a simple loop back test. Connect the SmartFade DMX input to the output. This test will initially send DMX out and attempt to receive it through its own input. If the transmitted pattern and the received pattern match up, the RDM direction switch over capability is also checked. Under normal working conditions this test will complete automatically in less than

a second. If this test fails, consult the DMX In / Out section of this manual for solutions.

Note: *This test can also be used as a simple DMX cable tester / DMX distribution chain tester.*

To bypass this test press the [✓] button.

MIDI Test

This is a simple loop back test. Connect the SmartFade MIDI input to the output. The test completes automatically in less than a second. If the test fails, please consult the MIDI In/ Out section of this manual for solutions.

Note: *This test can also be used as a simple MIDI cable tester / MIDI distribution chain tester.*

To bypass this test, press the [✓] button.

USB Test

This test will check the communications between the Processor and the USB chip. Under normal working conditions this test will conclude as “passed” in less than a second.

If there are problems, the LCD will show what bit-patterns were written to the USB-chip and what patterns came back. These patterns help to indicate shorted or open circuits on the system’s data bus.

After the completion of this test, the interrupt line is checked. If this is stuck at any level, an error message is generated. If errors are generated, or to proceed to the next test, press the [✓] button.

Note: *This test will not check USB communications between the Console and a PC. This can be achieved by performing a software upgrade cia USB. The SmartFade console will display as a MIDI audio device in the PC’s device manager.*

Memory Card Test

This test will check the memory card interface. If the memory card slot is empty, the display will show the “Write-Protect Switch” as On.

During insertion of a SD/MMC card, this switch will change status to off, and then in the end position to whatever the switch on the card was actually set to.

If the card makes electrical contact, the test routine will send a card-initialize command, and will wait for an answer from the card. When the answer arrives, the electrical interface to this card functions properly and the test will show a “pass”. If this test does not complete as passed after a known good memory card was inserted, check the electrical connections between the main and SD-card PCB’s. Also check the socket for bent pins or other mechanical damage.

To proceed to the next test, press the [✓] button.

System ID Test

This test will present the readout of the hardware versions of the board. It should read 000 for SmartFade 1248 and 001 for SmartFade 2496. All other numbers are reserved for future development.

End the test procedure by disconnecting and reapplying power to the console. At reboot the console will operate in the current mode.

CAUTION: *Progressing to the next menu, Internal Memory Test, will erase the entire memory in your board, including all show data and custom settings. To eliminate this possibility disconnect and reconnect the power to the console.*

Internal Memory Test

CAUTION: *This test will erase the entire memory, including all show data and custom settings, and restore the console to factory defaults! Pressing the [✓] button will initate the memory test immediately. To eliminate this possibility disconnect the power to the console.*

This test writes a certain pattern to all memory locations of the internal memory, and compares the readout to what it should be.

Under normal working conditions the console displays a progress status update (writing 0 → 100%, reading 0 → 100%), and then a test “passed” message. If there is a mismatch between the written and read back data, the console displays a message with the Memory address, written data and read back data. Use this data to detect eventual short or open circuits on the data / address bus. This test completes in less than 10 seconds.

To proceed to the next test, press the [✓] button.

Firmware Upgrade

It is possible to select a firmware upgrade option here. If [YES] is selected, the console changes into firmware update mode and awaits new firmware either via SD-Card or USB interface. Use the procedure described in the user manual to load the new firmware into the system. To abort the firmware upgrade process, cycle power on the console.

System Shutdown

After completion of all tests, the console will change to System Shutdown mode and remain in this mode until the power button is pressed.

Section 3: General Repair Strategy

The possibility of board level repairs without special tools is very limited in this product due to the extensive use of SMD components.

All electronic repairs should be limited to changing driver chips on the I/O boards, and changing faders on the main and extension assemblies. Any deeper problem should be resolved by swapping PCB's.

Section 4: Hardware Level Troubleshooting

DMX - In/Out

The power supply connected to unit needs to be able to provide at least 1.5A of 12V. The console internal voltage must, under all working conditions (e.g. all LEDs on), always be greater than 10V pre-voltage regulator, otherwise the DMX-In isolated power supply will not function.

DMX-In is the first function that stops working when the supply voltage drops below the minimum operating voltage.

- If **DMX-In** is not working anymore, there are a number of things to check:
  - Check the voltage across the I/O Board. Check C-19 for a voltage greater than 10VDC.
  - The DMX-In driver chip might be broken. Replace U5 with a new 75176 chip.
  - Check the voltage on the Isolated Power Supply test points. It needs to be 5VDC.
  - Check for a 100KHz pulse, 50% duty-cycle on U1, Pin 3. If there are no pulses, the problem might be on the main PCB.
- If **DMX-Out** does not function, it is likely that the DMX-Out driver chip is broken.
  - Replace the 75176 RD-485 driver chip U1, located on the I/O PCB.

Immediate Help

If the DMX-Out chip is broken and DMX-In is not used, it is possible to swap the DMX-In (U5) with the DMX-Out (U2) chips to get the DMX-Out functioning again.

MIDI - In/Out

- If **MIDI-In** is not working, it is likely that the MIDI-In chip is broken.
  - This is a standard 6N137 opto-coupler chip U4, located on the I/O PCB.
- If **MIDI-Out** is not working, it is likely that the MIDI-Out chip is broken.
  - This is a standard 74ACT02 logic chip U1, located on the I/O PCB.

Immediate Help

If the MIDI-IN chip is broken and DMX-In is not used, it is possible to swap the DMX-In opto-isolator (U3) with the MIDI-In (U4) chip, to get MIDI-In going again.

Section 5: Recommended Spare Parts

Description	ETC Part #	Location
Power Supply US	PS291 & PS291-J replaces PS236 after February 2005	
Power Supply EU	PS240	
Power Supply UK	PS241	
MIDI-Out driver chip, 74ACT02	Z1232	I/O PCB, U1
MIDI-In driver chip, 6N137	Z423	I/O PCB, U4
DMX-In/Out driver chip, 75176	Z216	I/O PCB, U2 & U5
Slide Pot Knob	4110A4036	All Faders
Channel Fader	P152	Channel Faders
Master Fader	P153	Master and Playback Faders
Encoder	L1080	Main PCB
Encoder knob top	HW8339	
Encoder knob body	HW8343	
Button Key Cap	7219A4006	
Channel 1-24 Key Pad Set	7219A2002	
Channel 25-48 Key Pad Sett	7219A2003	
12/48 Main Key Pad Assy	7219A2001	
24/96 Main Key Pad Assy	7219A2005	
12/48 Face Panel Overlay	7219A4001	
24/96 Face Panel Overlay	7219A4002	
Main PCB	7219B5001	
I/O PCB	7219B5002	
Extension PCB	7219B5003	
SD-Card PCB	7219B5005	
LCD PCB	7219B5004	

Appendix 1

SmartFade PCB's

This appendix contains the following sections:

- ***SmartFade Main PCB*** **10**
- ***SmartFade I/O PCB*** **12**
- ***SmartFade Extension PCB*** **13**
- ***SmartFade LCD Raiser PCB*** **14**
- ***SmartFade Memory Card PCB*** **14**

SmartFade Main PCB

TOP SIDE COMPONENTS

SYMBOL	DESCRIPTION	PART#
--	PCB SMARTFADE MAIN	7219B4001C
--	LABEL , 25" x , 80"	I204
(qty 71)	CAP , 1uF 50V 20% Z5U 0805	C9046
C1 C4 C7 C16-17 C21 C23-27 C29-34 C36-37 C41-42 C44-45 C47-48 C52-63 C65 C67 C69 C73-74 C77 C79-82 C84-86 C89-90 C93-95 C104 C106-109 C111-115 C118-121 C125 C127		
C2-3	CAP 1500pF 50V 5% NPO 1206	C9060
C5-6	CAP 1500pF 50V 5% NPO 1206	C9060
C8-15	CAP 1500pF 50V 5% NPO 1206	C9060
C18-19	CAP 10uF 6V 10% 1411 TANT	C9035
C20	CAP 100pF 50V 5% NPO 1206	C9006
C22	do not install	--
C28	do not install	--
C35	do not install	--
C38-39	CAP 100pF 50V 5% NPO 1206	C9006
C40	do not install	--
C43	do not install	--
C46	CAP 47uF 10V 20% 2917 TANT	C9054
C49	do not install	--
C50	CAP 47uF 10V 20% 2917 TANT	C9054
C51	CAP 100pF 50V 5% NPO 1206	C9006
C64	CAP 100pF 50V 5% NPO 1206	C9006
C66	do not install	--
C68	do not install	--
C70	do not install	--
C71	CAP 100pF 50V 5% NPO 1206	C9006
C72	CAP 47uF 10V 20% 2917 TANT	C9054
C75-76	CAP 18pF 50V 5% NPO 1206	C9003
C78	CAP 10uF 6V 10% 1411 TANT	C9035
C83	CAP 2.2uF 25V 10% 1411 TANT	C9017
C87	CAP 1000pF 50V 10% X7R 1206	C9011
C88	CAP 100pF 50V 5% NPO 1206	C9006
C91-92	do not install	--
C96-97	CAP 2.2uF 25V 10% 1411 TANT	C9017
C98	CAP 10uF 6V 10% 1411 TANT	C9035
C99	CAP 2.2uF 25V 10% 1411 TANT	C9017
C100	CAP 47uF 10V 20% 2917 TANT	C9054
C101-102	CAP 1uF 25V 20% 1206 TANT	C9009
C103	do not install	--
C105	CAP 10uF 6V 10% 1411 TANT	C9035
C110	CAP 100pF 50V 5% NPO 1206	C9006
C116-117	CAP 100pF 50V 5% NPO 1206	C9006
C122-123	do not install	--
C124	CAP 100pF 50V 5% NPO 1206	C9006
C126	do not install	--
C128	do not install	--
CR1-33	DIO SW 100V 0.5W 1N4148 MELF	CR9002
CR34	DIO SCHT 30V 0.2W BAT42/43	CR9032
CR35-49	DIO SW 100V 0.5W 1N4148 MELF	CR9002
J1	SMARTFADE I/O CARD CBL ASSY	7219B8001
J2	CON 14F FFC PCB .039 RA ZIF TP	J9033
J3	CON 10M HDR PCB .1 DR RA .230	J6763
J4-6	do not install	--

TOP SIDE COMPONENTS

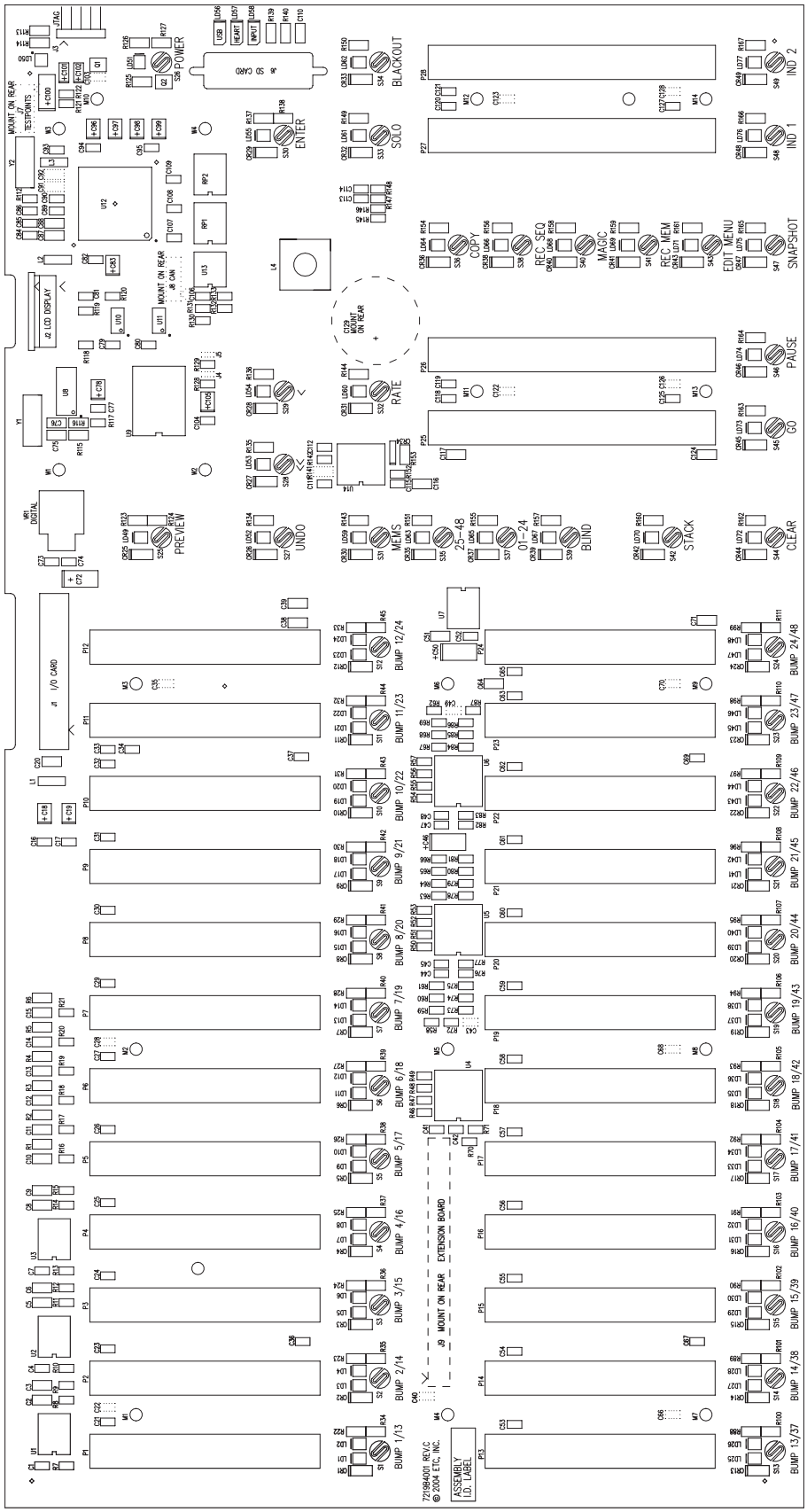
SYMBOL	DESCRIPTION	PART#
L1-3	IND FERRITE 80@100MHz 1A 1806	L9013
L4	ENCODER/SHAFT 12 CPR ALPS 20mm	L1080
(qty 28)	LEDR CLR 200mcd@22mA/660nmPLCC	CR9058
LD1 LD3 LD5 LD7 LD9 LD11 LD13 LD15 LD17 LD19 LD21 LD23 LD25 LD27 LD29 LD31 LD33 LD35 LD37 LD39 LD41 LD43 LD45 LD47 LD59 LD69 LD71 LD75		
(qty 28)	LEDG CLR 410mcd@16mA/525nmPLCC	CR9059
LD2 LD4 LD6 LD8 LD10 LD12 LD14 LD16 LD18 LD20 LD22 LD24 LD26 LD28 LD30 LD32 LD34 LD36 LD38 LD40 LD42 LD44 LD46 LD48 LD63 LD65 LD76-77		
LD49	LEDB CLR 405mcd@19mA/470nmPLCC	CR9061
LD50	LEDRB CLR 50/13mcd@10mA PLCC	CR9068
LD51	LEDB CLR 405mcd@19mA/470nmPLCC	CR9061
LD52-55	LEDW CLR 400mcd@18mA/WHT PLCC	CR9062
LD56	LEDO CLR 5mcd@20mA/630nm GUL	CR9008
LD57	LEDG CLR 7.5mcd@20mA/565nm GUL	CR9007
LD58	LEDR CLR 1.4mcd@15mA/700nm GUL	CR9005
LD60	LEDY CLR 200mcd@18mA/592nmPLCC	CR9060
LD61	LEDW CLR 400mcd@18mA/WHT PLCC	CR9062
LD62	LEDB CLR 405mcd@19mA/470nmPLCC	CR9061
LD64	LEDW CLR 400mcd@18mA/WHT PLCC	CR9062
LD66	LEDY CLR 200mcd@18mA/592nmPLCC	CR9060
LD67	LEDB CLR 405mcd@19mA/470nmPLCC	CR9061
LD68	LEDW CLR 400mcd@18mA/WHT PLCC	CR9062
LD70	LEDY CLR 200mcd@18mA/592nmPLCC	CR9060
LD72	LEDW CLR 400mcd@18mA/WHT PLCC	CR9062
LD73	LEDB CLR 405mcd@19mA/470nmPLCC	CR9061
LD74	LEDW CLR 400mcd@18mA/WHT PLCC	CR9062
M1-14	do not install	--
P1-24	SLIDE 10K 45mm SNGL ALPS	P152
P25-28	SLIDE 10K 60mm SNGL ALPS	P153
Q1-2	TRN FETN 0.2A 50V BSS138 SOT23	Q9013
R1-6	RES 1M 1/8W 1% 1206	R9093
R7	RES 300 1/10W 5% 0805	R9143
R8-9	RES 100 1/10W 5% 0805	R9136
R10	RES 300 1/10W 5% 0805	R9143
R11-12	RES 100 1/10W 5% 0805	R9136
R13	RES 300 1/10W 5% 0805	R9143
R14-21	RES 100 1/10W 5% 0805	R9136
R22-33	RES 0 1206	R9159
R34-45	RES 33 1/8W 5% 1206	R9030
R46-57	RES 1K 1/10W 5% 0805	R9137
R58-69	RES 5.6 1/10W 5% 0805	R9304
R70-71	RES 300 1/10W 5% 0805	R9143
R72-75	RES 5.6 1/10W 5% 0805	R9304
R76-77	RES 300 1/10W 5% 0805	R9143
R78-81	RES 5.6 1/10W 5% 0805	R9304
R82-83	RES 300 1/10W 5% 0805	R9143
R84-87	RES 5.6 1/10W 5% 0805	R9304
R88-99	RES 0 1206	R9159
R100-111	RES 33 1/8W 5% 1206	R9030
R112	RES 1M 1/10W 5% 0805	R9139
R113	RES 100 1/8W 5% 1206	R9008

TOP SIDE COMPONENTS

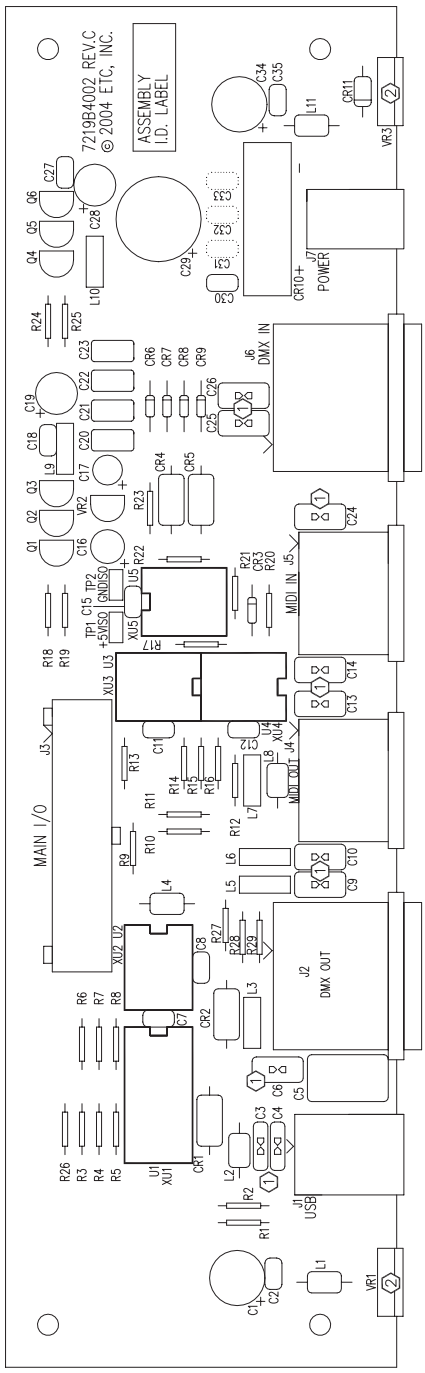
SYMBOL	DESCRIPTION	PART#
R114	RES 10 1/8W 5% 1206	R9059
R115-116	RES 1M 1/8W 5% 1206	R9017
R117	RES 300 1/10W 5% 0805	R9143
R118	RES 1K 1/10W 5% 0805	R9137
R119	RES 10K 1/10W 5% 0805	R9138
R120	RES 300 1/10W 5% 0805	R9143
R121	RES 1K 1/10W 5% 0805	R9137
R122	RES 10K 1/10W 1% 0805	R9148
R123	RES 10 1/8W 5% 1206	R9059
R124	RES 0 1206	R9159
R125	RES 10 1/8W 5% 1206	R9059
R126	RES 59 1/8W 1% 1206	R9044
R127	RES 1.3K 1/8W 5% 1206	R9117
R128-129	RES 10K 1/10W 5% 0805	R9138
R130-133	RES 300 1/10W 5% 0805	R9143
R134-136	RES 0 1206	R9159
R137	RES 33 1/8W 5% 1206	R9030
R138	RES 270 1/8W 1% 1206	R9156
R139-140	RES 560 1/8W 5% 1206	R9033
R141	do not install	--
R142	RES 300 1/10W 5% 0805	R9143
R143-144	RES 33 1/8W 5% 1206	R9030
R145-148	RES 1K 1/10W 5% 0805	R9137
R149-151	RES 0 1206	R9159
R152	RES 1.2K 1/10W 5% 0805	R9140
R153	RES 470 1/8W 5% 1206	R9049
R154-155	RES 0 1206	R9159
R156	RES 33 1/8W 5% 1206	R9030
R157-158	RES 0 1206	R9159
R159-161	RES 33 1/8W 5% 1206	R9030
R162-164	RES 0 1206	R9159
R165	RES 33 1/8W 5% 1206	R9030
R166-167	RES 0 1206	R9159
RP1	RES/DIP 10K 5% 16P 15R BUSS	R9116
RP2	RES/DIP 4.7K 5% 16P 15R BUSS	R9089
S1-49	do not install	--
U1-3	IC 74HC4052 DUAL 4-1 AMUX SO16	Z9012
U4-6	IC 74ACT244 OCT 3S BUF SOL20	Z9201
U7	IC ULN2003A 7x 0.5A DRVR SO16	Z9334
U8	IC ISP1181 USB RCVR TSSOP48	Z9329
U9	IC SRAM 128Kx16 55nS 3V TSOP44	Z9336
U10-11	IC 74ACT574 OCT 3S FF TSSOP20	Z9327
U12	IC 56F8356 DSP 128Kx16b QFP144	Z9330
U13	IC 74ACT02 QUAD 2-IN NOR SO14	Z9335
U14	IC DS1314 NVM CNTL 3V SOL16	Z9328
VR1	REG 3.3V 1A LDO LM3940 TO263	VR9007
W1-4	do not install	--
Y1	CRYS 6.000 MHz	Y9031
Y2	CRYS 8.000 MHz	Y9022

BOTTOM SIDE COMPONENTS

SYMBOL	DESCRIPTION	PART#
C129	CAP 1F 5.5V GOLDCAP 22x8mm/.2	C145
J7-8	do not install	--
J9	CON 50M HDR PCB .1 DR SH LP LA	J6188
TP1-8	do not install	--


J1 I/O CARD
J9 MOUNT ON REAR EXTENSION BOARD
J6 SD CARD
J5 JTAG
J7 TESTPOINTS
J8 CAN
J2 LCD DISPLAY
MOUNT ON REAR
MOUNT ON REAR
MOUNT ON REAR

SmartFade I/O PCB



SYMBOL	DESCRIPTION	PART#
--	PCB SMARTFADE I/O	7219B4002C
--	LABEL .25" x .80"	1204
C1	CAP 470uF 10V 8x12mm/.15 AL	C297
C2	CAP .1uF 50V 20% Z5U .1 CER	C106
C3-4	CAP 18pF 200V 10% X7R .2 CER	C131
C5	CAP .022uF 2KV 20%X7R .375 CER	C334
C6	CAP 100pF 1KV 10% S3N .2 CER	C179
C7-8	CAP .1uF 50V 20% Z5U .1 CER	C106
C9-10	CAP 100pF 1KV 10% S3N .2 CER	C179
C11-12	CAP .1uF 50V 20% Z5U .1 CER	C106
C13-14	CAP 100pF 1KV 10% S3N .2 CER	C179
C15	CAP .1uF 50V 20% Z5U .1 CER	C106
C16	CAP 10uF 20V 10% .1 TANT	C168
C17	CAP 1uF 50V 20% .1 TANT	C223
C18	CAP .1uF 50V 20% Z5U .1 CER	C106
C19	CAP 10uF 35V 10% .25 TANT	C167
C20-23	CAP 1uF 50V 20% Y5V .2 CER	C161
C24-26	CAP 100pF 1KV 10% S3N .2 CER	C179
C27	CAP .1uF 50V 20% Z5U .1 CER	C106
C28	CAP 10uF 35V 10% .25 TANT	C167
C29	CAP 1000uF 35V 13x20mm/.2 AL	C166
C30	CAP .1uF 50V 20% Z5U .1 CER	C106
C31-33	do not install	--
C34	CAP 470uF 10V 8x12mm/.15 AL	C297
C35	CAP .1uF 50V 20% Z5U .1 CER	C106

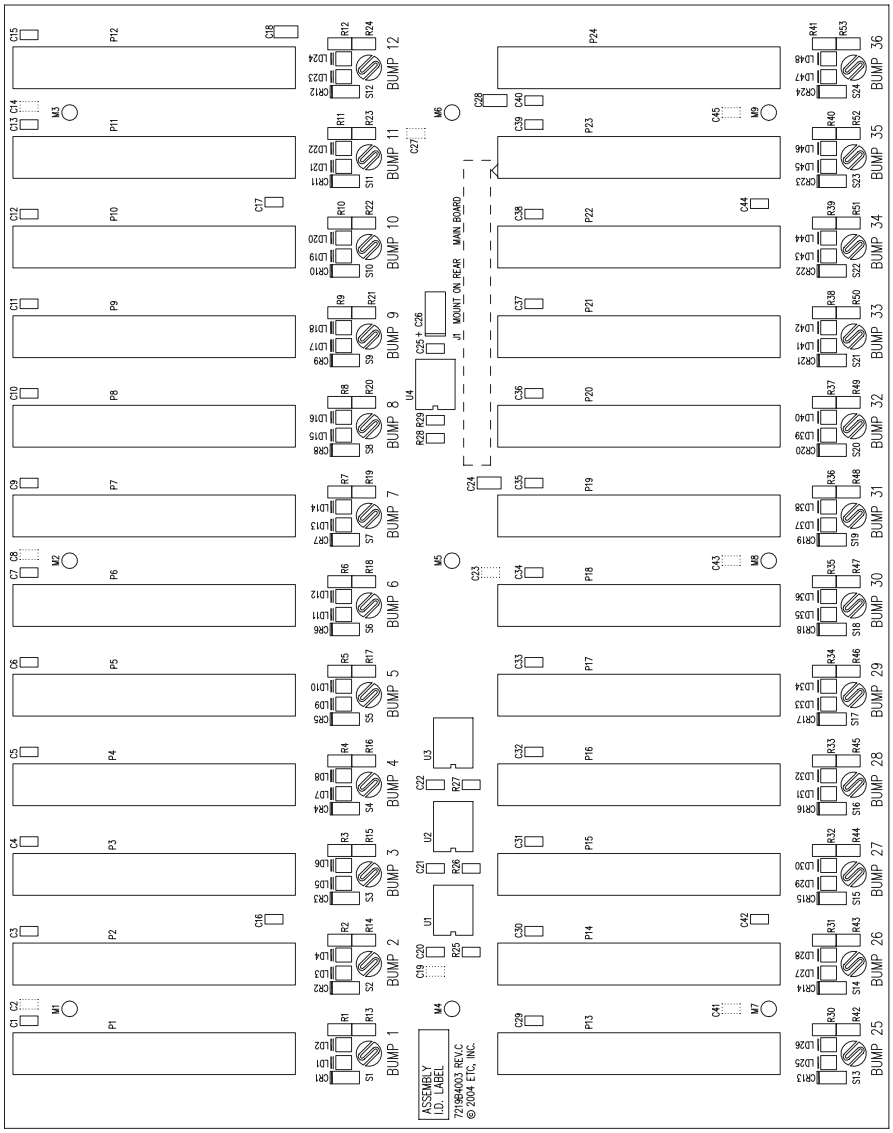
SYMBOL	DESCRIPTION	PART#
CR1-2	DIO TVS 20V 500W BI-DIR .5	CR222
CR3	DIO SW 100V 0.25W 1N914 .4	CR124
CR4-5	DIO TVS 20V 500W BI-DIR .5	CR222
CR6-9	DIO SCHT 30V 0.2W BAT85	CR203
CR10	RECT BRID 4A 50V SIP	CR122
CR11	RECT SCHT 1A 20V 1N5817	CR151
J1	CON 4F USB "B" PCB RA SHLD	J6755
J2	CON 5F XLR PNL/PCB RA SHLD	J6761
J3	CON 26M HDR PCB .1 DR SH LP LA	J679
J4-5	CON 5F DIN PCB RA SHLD AMP	J1173
J6	CON 5M XLR PNL/PCB RA SHLD	J6762
J7	CON 1F MINI DC PWR PCB 2.5mm	J839
L1-2	IND FERRITE 60@100MHz 1T	L134
L3	EMI "T" FILTER 470pF 100V	L136
L4	IND FERRITE 60@100MHz 1T	L134
L5-7	EMI "T" FILTER 470pF 100V	L136
L8	IND FERRITE 60@100MHz 1T	L134
L9-10	EMI "T" FILTER 470pF 100V	L136
L11	IND FERRITE 60@100MHz 1T	L134
Q1-2	TRN NPN 0.2A 40V 2N3904 TO92	Q101
Q3	TRN PNP 0.6A 60V 2N2907 TO92	Q102
Q4-5	TRN NPN 0.2A 40V 2N3904 TO92	Q101
Q6	TRN PNP 0.6A 60V 2N2907 TO92	Q102
R1-2	RES 18 1/4W 5% CF	R410
R3-5	RES 330 1/4W 5% CF	R146
R6	RES 1K 1/4W 5% CF	R101

SYMBOL	DESCRIPTION	PART#
R7	RES 330 1/4W 5% CF	R146
R8	RES 10K 1/4W 5% CF	R103
R9	RES 1K 1/4W 5% CF	R101
R10-11	RES 220 1/4W 5%	R225
R12-16	RES 1K 1/4W 5% CF	R101
R17	RES 330 1/4W 5% CF	R146
R18-19	RES 1K 1/4W 5% CF	R101
R20	RES 220 1/4W 5%	R225
R21	RES 10M 1/4W 5% CF	R184
R22	RES 120 1/4W 5%	R180
R23	RES 10M 1/4W 5% CF	R184
R24-25	RES 1K 1/4W 5% CF	R101
R26	RES 10K 1/4W 5% CF	R103
R27	RES 560 1/4W 5% CF	R121
R28	RES 130 1/4W 5%	R1116
R29	RES 560 1/4W 5% CF	R121
TP1-2	TEST CLIP TP-101-10	J6198
U1	IC 74ACT02 QUAD 2-IN NOR DIP14	Z1232
U2	IC 75176 RS485 XCVR DIP8	Z216
U3-4	IC 6N137 OPTO LOGIC DIP8	Z423
U5	IC 75176 RS485 XCVR DIP8	Z216
VR1	REG 5V 1.5A TO220	VR107
VR2	REG 5V 0.1A 78L05 TO92	VR105
VR3	REG 5V 1.5A TO220	VR107
XU1	SOC 14P DIP DW .3	J350
XU2-5	SOC 8P DIP DW .3	J361

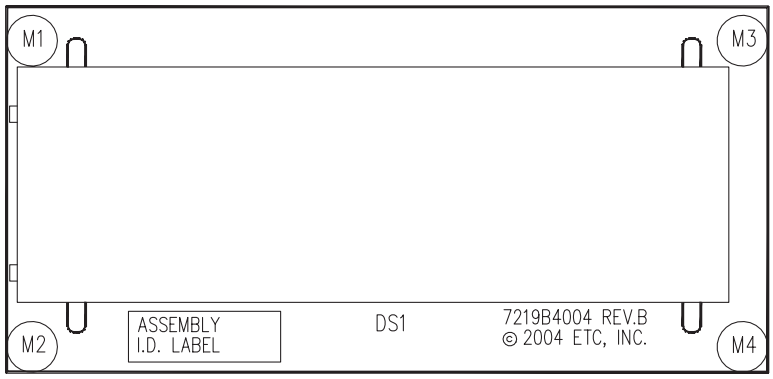
SmartFade Extension PCB

TOP SIDE COMPONENTS

SYMBOL	DESCRIPTION	PART#
--	PCB SMARTFADE EXTENSION	7219B4003C
--	LABEL .25" x .80"	I204
C1	CAP .1uF 50V 20% Z5U 0805	C9046
C2	do not install	--
C3-7	CAP .1uF 50V 20% Z5U 0805	C9046
C8	do not install	--
C9-13	CAP .1uF 50V 20% Z5U 0805	C9046
C14	do not install	--
C15-17	CAP .1uF 50V 20% Z5U 0805	C9046
C18	CAP 100pF 50V 5% NP0 1206	C9006
C19	do not install	--
C20-22	CAP .1uF 50V 20% Z5U 0805	C9046
C23	do not install	--
C24	CAP 100pF 50V 5% NP0 1206	C9006
C25	CAP .1uF 50V 20% Z5U 0805	C9046
C26	CAP 47uF 10V 20% 2917 TANT	C9054
C27	do not install	--
C28	CAP 100pF 50V 5% NP0 1206	C9006
C29-40	CAP .1uF 50V 20% Z5U 0805	C9046
C41	do not install	--
C42	CAP .1uF 50V 20% Z5U 0805	C9046
C43	do not install	--
C44	CAP .1uF 50V 20% Z5U 0805	C9046
C45	do not install	--
CR1-24	DIO SW 100V 0.5W 1N4148 MELF	CR9002
J1	SMARTFADE EXTENSION CBL ASSY	7219B8002
(qty 24)	LEDR CLR 200mcd@22mA/660nmPLCC	CR9058
LD1 LD3 LD5 LD7 LD9 LD11 LD13 LD15 LD17 LD19 LD21 LD23 LD25 LD27 LD29 LD31 LD33 LD35 LD37 LD39 LD41 LD43 LD45 LD47		
(qty 24)	LEDG CLR 410mcd@16mA/525nmPLCC	CR9059
LD2 LD4 LD6 LD8 LD10 LD12 LD14 LD16 LD18 LD20 LD22 LD24 LD26 LD28 LD30 LD32 LD34 LD36 LD38 LD40 LD42 LD44 LD46 LD48		
M1-9	do not install	--
P1-24	SLIDE 10K 45mm SNGL ALPS	P152
R1-12	RES 0 1206	R9159
R13-24	RES 33 1/8W 5% 1206	R9030
R25-27	RES 300 1/10W 5% 0805	R9143
R28-29	RES 1K 1/10W 5% 0805	R9137
R30-41	RES 0 1206	R9159
R42-53	RES 33 1/8W 5% 1206	R9030
S1-24	do not install (LOCATED ON BOTTOM SIDE)	--
TP1-8	do not install (LOCATED ON BOTTOM SIDE)	--
U1-3	IC 74HC4052 DUAL 4-1 AMUX SO16	Z9012
U4	IC ULN2003A 7x 0.5A DRVR SO16	Z9334



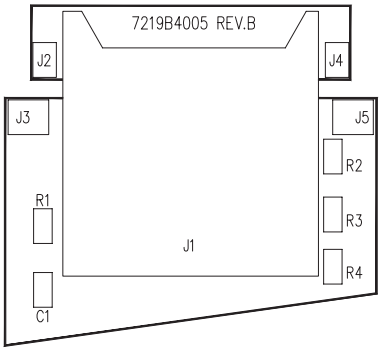
SmartFade LCD Raiser PCB



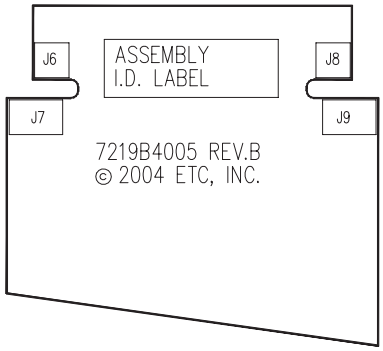
SYMBOL	DESCRIPTION	PART#
--	PCB SMARTFADE LCD	7219B4004B
--	LABEL . 80" x . 25"	I204
DS1	LCD 2x20 CHAR COG WHT LED B/L	7020B2001
M1-4	do not install	--

SmartFade Memory Card PCB

TOP SIDE COMPONENTS



BOTTOM SIDE COMPONENTS



SYMBOL	DESCRIPTION	PART#
--	PCB SMARTFADE SD CARD	7219B4005B
C1	CAP . 1uF 50V 20% Z5U 0805	C9046
J1	SOC 9P SD-CARD RA PUSH-PUSH	J9034
J2-5	do not install	--
R1-4	RES 10K 1/10W 1% 0805	R9148

SYMBOL	DESCRIPTION	PART#
--	LABEL . 80" x . 25"	I204
J6-9	do not install	--

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